APPENDIX J

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APPENDIX K

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APPENDIX L

Keyword Index

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Volume II

APPENDIX N

Directional Drilling Monitoring and Operations Program for Natural Gas Pipeline Installation in Long Island Sound for Islander East Pipeline Co., LLC.

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1.0 INTRODUCTION

Islander East Pipeline Company, L.L.C. (Islander East) proposes to install a natural gas pipeline across Long Island Sound (LIS) from Branford, Connecticut to Wading River (Brookhaven), New York as shown on the attached drawings (see Attachment C of the permit application package). The pipeline will be installed using directional drilling techniques on the Connecticut side in the near shore environment (out to water a depth of 20±) to minimize potential impacts in the intertidal and near shore zones. In deeper water the pipeline will be installed using other techniques. The location and methods are described more fully in the permit application and application attachments. This monitoring and operations program is being submitted to the Connecticut Department of Environmental Protection (CTDEP) Office of Long Island Sound Programs and the U.S. Army Corps of Engineers (USACOE), to show the procedures, manpower and equipment requirements to ensure protection of the environment during pipeline installation, using directional drilling techniques in Connecticut waters.

Drilling fluids are utilized during the horizontal directional drilling (HDD) process. The primary constituents of drilling fluids are water and bentonite. Bentonite is a sedimentary rock formed largely from the clay mineral montmorillonite and it has great ability to adsorb water and swell. The bentonite slurry is used to seal the walls of the borehole, cool and lubricate the drill bit and transport the drill cuttings back to the beginning of the borehole. While the bentonite drilling fluid is usually contained within the borehole, an unplanned release may occur. This unplanned release can occur when a geologic fault or fissure is initially penetrated, as the drilling fluid is pumped into the borehole under pressure. The occurrence of an unplanned release is dependent upon many factors including: geology, depth of borehole, pressure, borehole diameter, drilling fluid consistency and rate of drilling. In the course of the drilling operation, there is a projected release of drilling fluids at the

underwater bore exit hole. This anticipated release of drilling fluid occurs during the initial pilot hole seafloor penetration, during the final pipeline pullback from the offshore setup, and, to a greater extent, during the reaming passes. A plan to control and capture drilling fluid during the reaming passes is under development (refer to Appendix B in this document). The anticipated release of drilling fluid at the bore exit hole during the pilot hole drilling, during the pipeline pullback, and during the reaming passes will be monitored and managed differently than the remainder of the drill path, where an unplanned release could occur.

The monitoring and operations program outlined in this document will be implemented during directional drilling activities to address a potential unplanned release of drilling fluid shoreward of the underwater exit hole. Section 2 of this document details the technical approach and equipment to be used during the monitoring program. Section 3 defines the various monitoring and operation conditions. Section 4 describes the monitoring and operation scenarios and details the activities to be conducted under the various conditions. Section 5 discusses the post drilling monitoring program. This Monitoring and Operations Program is to be used as a guidance document. During construction, discussion and mutual agreement between the USACOE, CTDEP and Islander East shall provide a mechanism to alter this Program based on field conditions.

2.0 TECHNICAL APPROACH - MONITORING PROGRAM

The objective of this directional drilling monitoring program is to quickly identify the unplanned release of drilling fluids, determine the size, extent and location of the release and prepare for the possible containment and cleanup of the material. Monitoring will be conducted at regular intervals during drilling activities. All monitoring activities will be conducted by an independent contractor to Islander East and will be coordinated by an on-site monitoring supervisor who will work closely with the CTDEP, Islander East and the drilling operators.

2.1 Overview of Monitoring Program

To accomplish the objective of the monitoring program for an unplanned release, a data acquisition plan will rely on three monitoring techniques. The monitoring equipment and manpower will consist of a survey vessel capable of operations under most weather conditions, a first level detection system consisting of remote sensing hardware (side scan sonar and fluorometry), a second level inspection system consisting of an underwater color television camera (ambient turbidity conditions permitting), and the final level of identification consisting of divers. This arrangement should provide the greatest operating range for the monitoring crew and the quickest method for detection.

The survey vessel will operate under all safe weather conditions, up to U.S. Coast Guard Small Craft Warnings. First level survey monitoring will be conducted during daylight hours at a frequency of one (1) day per week while directional drilling, borehole reaming and pipeline pullback operations are being performed. The first level of detection, remote sensing, will be operational within this same envelope. Fluorometric dye solution will only be added to the drilling fluid mixture during the initial pilot hole drilling and fluorometric monitoring will only be used during this phase of

the work. The second monitoring level, an underwater television camera, has an operational envelope of up to 1.5 knots of current if used as a stationary system or up to three foot seas if used on a Remotely Operated Vehicle (ROV). Ambient water turbidity levels may affect the ability to employ underwater camera methods and this method will only be used if visibility is 5 feet or greater. The underwater television camera will be utilized within its working envelope to confirm any anomalies detected by the remote sensing hardware. The third level, divers, will be deployed if currents are below one knot and seas are less than two feet. Divers will be used in daylight within their operational envelope to investigate anomalies detected by the first two monitoring levels.

2.2 Equipment

The following equipment (or equal) will be used during the implementation of the monitoring program:

1. Survey Vessel
2. Trimble 4000 Differential Global Positioning System (DGPS)* or equivalent
3. Maretrack II Vessel Trackline Control and Data Logging System* or equivalent
4. Klein 595 500kHz Side Scan Sonar with Slant Range Speed Correction* or equivalent
5. Turner Designs Model 10 Digital Recording Fluorometer* or equivalent
6. Rhodamine WT Dye* or equivalent
7. Hydroproducts TC-125 Underwater Color Camera with Lighting and Deployment Sled* or Remotely Operated Vehicle (ROV) or equivalent
8. Core Sampler
9. Shipek Grab Sampler* or equivalent
10. Pipe Dredge

* Refer to Attachment I of this document for equipment specifications

2.2.1 Survey Vessel, Positioning and Navigation

Field surveys will be conducted aboard a minimum 20-foot long survey vessel. The survey vessel will be maneuverable at lower tide ranges and will be constructed of fiberglass or other material which will not interfere with the directional drill steering electronics. The vessel will have a fully

enclosed cabin, permitting all-weather operation, and will be powered by twin motors to ensure reliable operation.

To position and navigate the survey vessel, an electronic positioning system (EPS) interfaced with a navigation system will be employed. The EPS will be a high resolution, dynamic positioning system, which offers ±3 meter accuracy such as the Trimble Differential Global Positioning System (DGPS) or equivalent. Vessel position data will be updated at one-second intervals and input to the navigation system computer which processes these range data into x,y coordinates which are used to guide the survey vessel accurately along preselected tracklines. The incoming position data are logged on disk and processed in real time allowing the survey vessel position to be projected on a video monitor in order to follow the actual trackline being surveyed at that time. Pre-survey tracklines along with digitized shoreline and locations of control stations or buoys can also be represented on screen in relation to the vessel position. The navigation system will provide an accurate visual representation of survey vessel location in real time, combined with highly efficient data logging capability and post-survey data processing and plotting packages.

During the monitoring operations (using side scan sonar and fluorometry) the survey vessel will be piloted along predetermined tracklines. Vessel positions which correlate with event marks made on the data records will be recorded at frequent intervals along each trackline.

2.2.2 Side Scan Sonar Imaging

Side scan sonar images of the sea floor will be obtained using a high resolution, dual channel side scan system operating at a frequency of approximately 500 Khz. The system will include a thermal paper recorder, 250 foot long sensor cable, and a dual frequency towfish with depressor. The side scan sonar fish will be towed off a boom lashed to the stern which serves to keep the side scan

cable out away from the boat and particularly the engines. The fish will be typically towed at an appropriate height above the sea floor to provide high resolution imagery of the directional drill corridor.

As with many other geophysical instruments, the side scan sonar derives its information from reflected acoustic energy. A set of transducers mounted in a compact towfish generates the high power, short duration acoustic pulses required for extremely high resolution. The pulses are emitted in a thin, fan-shaped pattern that spreads downward to either side of the fish in plane perpendicular to its path. As the fish progresses along the trackline, this acoustic beam sequentially scans the sea floor from a point beneath the fish, outward as far as 300 meters to each side of the survey trackline.

Acoustic energy reflected from any bottom discontinuities is received by the set of transducers in the towfish, amplified and transmitted to the survey vessel via the tow cable where it is further amplified, processed and converted to a graphic record by the side scan recorder. The sequence of reflections from the series of pulses is displayed on the dual-channel graphic recorder on which paper is incrementally advanced prior to printing each acoustic pulse. The resulting output is essentially analogous to a high angle, oblique "photograph" providing detailed representation of the sea floor features and characteristics.

Deposition of bentonite drilling fluid onto the sea floor will create a surface discontinuity (reflectional characteristic), which will likely be different from the surrounding sea floor conditions. Differing reflectional characteristics are sensed and recorded by the side scan sonar equipment, producing a unique "fingerprint" of the sea floor conditions. A release can be detected and monitored by comparing initial baseline imagery to subsequent monitoring imagery or by comparing current monitoring imagery to previous ones. Side scan sonar will be a useful first detection and mapping tool for release and will permit the monitoring area to be easily expanded if conditions dictate. Side

scan sonar will show the aerial extent of drilling fluid deposits, if any, but other techniques such as core sampling will be needed to determine thickness.

The images recorded on paper will be fully corrected for slant range and speed distortions. This enables the operator to assemble true scale sonar mosaics. In this mode, the sonar data has the water column removed and the selected range setting sets the exact width of the sea bed swath to be displayed. The ping rate shall be optimized to ensure as many pings on the target as possible. The image produced shall also be aspect ratio corrected, with the vessel's towing speed being entered externally from an interface (or equivalent) to the navigational system. Altitude information is extracted from the sonar signal.

Position information will be coupled to the side scan system by way of the navigation system. As the survey vessel travels along a trackline, the navigation system or equivalent outputs an "event" pulse to the side scan recorder generating an event mark on the graphic record at predetermined time increments during the monitoring surveys. Event marks will be sequentially numbered and logged with vessel position and time into the logging computer (or equivalent).

2.2.3 Fluorometry

To enhance detection the presence of bentonite drilling fluid on the seafloor or in the water, the drilling fluids will be marked with a soluble fluorescent dye tracer. The dye tracer will only be added to the drilling fluid during the drilling of the initial pilot hole. If an unplanned release of drilling fluid occurs during reaming passes, the volume of drilling fluid used in reaming is much greater and readily detectable with side scan sonar. Rhodamine WT (or equivalent), a biodegradable, fluorescent tracer that is extremely soluble in water and detectable in very low concentrations via fluorometry (less than 0.1 parts per billion), will be utilized for this project. The dye is supplied as a 20 percent

aqueous solution by Crompton and Knowles Corporation, Gibraltar, Pennsylvania, or equivalent. The dye will be mixed with the drilling fluid by the drilling crew to approximately 5,000 ppb. The drilling crew will visually monitor the dye concentration entering the borehole as well as returning to ensure it will be able to be detected by the remote sensing equipment. It has been shown in laboratory tests by Ocean Surveys that the dye will solubilize from a bentonite, water and dye, mud-like mixture into the surrounding waters and will be detectable using fluorometric techniques. The dye is also visible to the eye.

Dye concentrations in the water column will be monitored using a fluorometer fitted with a flow-through sample chamber. Fluorescence data will be output to a two-pen strip chart recorder or equivalent and to the navigation computer in digital format. Submersible pumps, towed from a subsurface array, will be used to continuously circulate sample water through the sight glass of the fluorometer.

The fluorometer provides a relative measure of the quantity of light emitted from a fluorescent solution. In principle, a lamp within the fluorometer emits light which is filtered to the excitation frequency of Rhodamine WT and allowed to strike the sample. Any dye present in the solution will fluoresce. The emitted light is passed through a secondary filter to a sensor, compared to the source light and the relative quantity of light indicated by the fluorometer readout.

Since the fluorescence of dye varies with sample temperature, the water sample temperature must be recorded with the fluorescence data. A temperature sensor is located immediately downstream of the fluorometer sight glass and is used to record sample temperature. The output of the thermistor is recorded onto one pen of the strip chart recorder. These temperature data are used during real time processing to correct the dye concentration data for temperature variations. The

fluorometer system will be installed aboard the survey vessel to monitor dye concentrations from near bottom using an integrated intake array.

The initial dye concentration of the fully mixed drilling fluids will be approximately 5,000 parts per billion. Based on recent aquarium tests, it is expected that solubilized dye concentrations in the water just over released drilling fluids will be in the range of 10 to 50 ppb. Dye concentrations will be used to assist in locating an unplanned release during pilot hole drilling prior to visual confirmation, by following the dye concentration gradient to its maximum point.

Pre- and post-survey calibrations of the fluorometer will be conducted using standard solutions prepared with dye drawn from the same lot as used for the study. This will insure the maximum dynamic range of sensitivity for this project. Calibration solutions will be prepared employing Class A glassware as established by the National Bureau of Standards.

2.2.4 Underwater Television Camera

Underwater television imaging (visibility conditions permitting) will be employed using an underwater color television camera mounted on a sled and/or remotely operated vehicle (ROV). The camera will be used only if visibility is at least five (5) feet. The camera will be a solid state, self contained, portable unit consisting of a watertight, cylindrical housing which contains an optical system, videocon television camera tube and associated components.

Depending on the monitoring scenario, the sled or ROV will be either towed or flown by the survey vessel with data recorded by an on-board video monitor. To image known targets, the camera will be either lowered to the bottom or flown over it with the ROV.

The camera will provide remote, real-time observations of the seafloor and underwater environment, which will be displayed on a standard video monitor and recorded on VCR video tape. An annotator will be used to record observations and position information directly on the videotape.

The camera will be used to document the features of a suspected area of drilling fluid release, in the event that there has been an unplanned release detection by either side scan sonar or flourometry.

2.2.5 Diver Investigation

A two man dive team with separate vessel will be on-call and available within 24 hours notice to the site during all drilling activities with either standard scuba or surface supplied air equipment. The divers will be involved in four monitoring activities: 1) confirmation/investigation of a suspected unplanned release, 2) pilot borehole exit monitoring, 3) borehole exit monitoring during pipeline pullback, and 4) containment and remediation activities. High seas and dangerous diving conditions may limit the use of divers under certain circumstances.

The divers will enter the water to confirm a suspected unplanned release location detected by the remote sensing equipment and as listed above. The survey vessel will navigate to the suspected site and employ a marker. The divers will descend to the bottom on this downline and perform a circle search of approximately 25 feet. The diver will collect seabed samples and describe bottom features. Should a release occur, the divers will be available to assist with monitoring, reporting, implementation of containment measures and remediation.

A second dive team will be on-call and will be available to assist the primary team within twenty-four (24) hours of notification.

2.2.6 Benthic Sampling

Sampling will be employed to confirm the visual data. The order of sampling will be:

1. Bottom coring
2. Shipek grab sampling
3. Pipe dredge sampling

Bottom coring, employing a minimum two inch diameter tube, will be used to collect samples of surficial sediments. The coring can be done from the survey vessel or by diver. In both methods the corer will be pushed into the bottom to recover a sample and either capped or brought directly up to the surface with the least amount of disturbance to the sediment/water interface. Upon recovery, the cores will be measured, described and photographed if bentonite is detected.

If bottom coring is unsuccessful, a Shipek sediment sampler or equivalent will be used. The Shipek sediment sampler is used to sample unconsolidated sediment, from soft ooze to hard-packed coarse sand and is capable of bringing practically undisturbed, unwashed samples to the surface from any water depth. The Shipek sampler is designed to take a 1/25 square meter surface area sample approximately 10 cm deep at the center. It is therefore particularly well adapted for sampling benthos living at or immediately below the water-sediment interface. The unit is composed of two concentric half cylinders. The inner semi-cylinder, or sample bucket, is rotated at high torque by two helically wound external springs. Upon contact with the bottom it is automatically triggered by the inertia of a self-contained weight on a gear mechanism. At the end of its 180-degree travel, the sample bucket is stopped and held in the closed position by residual spring torque. After closure, the sample is given optimum protection from washout during the return trip to the surface by the configuration of the unit. On deck, the sample will be removed from the unit and the sediments inspected for drilling fluid.

If bottom debris, such as large rocks, prohibit the use of either of the above methods, a pipe dredge will be employed. A pipe dredge consists of a two foot diameter by three foot long iron pipe

closed at one end with a harness attachment at the other end. The dredge is towed through the target area and all material collected returned to the surface. A pipe dredge will usually be successful in obtaining a surface sample where other samplers will not work.

3.0 MONITORING AND OPERATING CONDITIONS

The monitoring team will conduct operations in accordance with the following schedule of activities:

1. Condition One

   No unplanned release, drilling operation normal: Once weekly routine survey consisting of side scan sonar and fluorometry (during pilot hole drilling) from survey vessel.

2. Condition Two

   Documented loss of circulation by drilling crew but no release evident: Conduct focused survey designed to locate a potential drilling fluid release consisting of side scan sonar, fluorometry (during pilot hole drilling) and television monitoring. Prepare to elevate to next condition by putting diving and remediation crews on notice.

3. Condition Three

   Unplanned drilling fluid release to seafloor or water column confirmed: Notify CTDEP, National Marine Fisheries (NMF), USACOE, conduct material distribution survey and sampling with divers, if possible, and the equipment aboard the survey vessel.

4. Condition Four

   Remediation/containment survey will be performed. Mapping and sampling of the disturbed area will be conducted. Containment of unplanned release may be implemented, if deemed necessary following discussion with CTDEP, NMF and USACOE . Removal of unplanned release will be performed in consultation with CTDEP and USACOE.

4.0 MONITORING AND OPERATING SCENARIOS

The monitoring teams, equipment and scope of work required for this project will be as follows:

a. A survey vessel equipped with side scan sonar, fluorometer, underwater television camera and sediment sampling equipment will monitor the drill path and down current area on a once weekly schedule and as required to monitor an unplanned release.

b. A dive team consisting of two divers will be on call and capable of being on-site with twenty-four hours notice to inspect the drill path if a release has been detected. The dive team will be able to install the bentonite containment fencing which will be kept on-site at a length of 600 linear feet and the floating silt curtain which shall be kept on-site at a length of 200 linear feet.

c. A remediation crew consisting of a vessel and crew equipped with vacuum and other removal and containment equipment will be on-call and capable of being on-site within 24 hours notice.

4.1 Condition One: Routine Monitoring

The routine monitoring and operating program will be implemented by the drill rig operators and the monitoring team. The drilling operator will be responsible for supplying information to the monitoring plan supervisor. The routine monitoring program will be coordinated by the on-site monitoring plan supervisor.

4.1.1 Operations Program

The drilling operator shall supply the following information to the monitoring plan supervisor every 12 hours:

- Position of the drilling head relative to the drilling point of entry;
- Recording of the total volume of drilling fluid mixed and in use. The actual volume must be estimated due to the inconsistency in bentonite swelling from batch to batch. The drilling fluid is typically 4% or less bentonite by volume in a fresh water mixture;
- Calculation of the estimated volume used based on current total drill path length and diameter of borehole;
- Comparison of the current volume of drilling fluid used and the estimated current total volume.

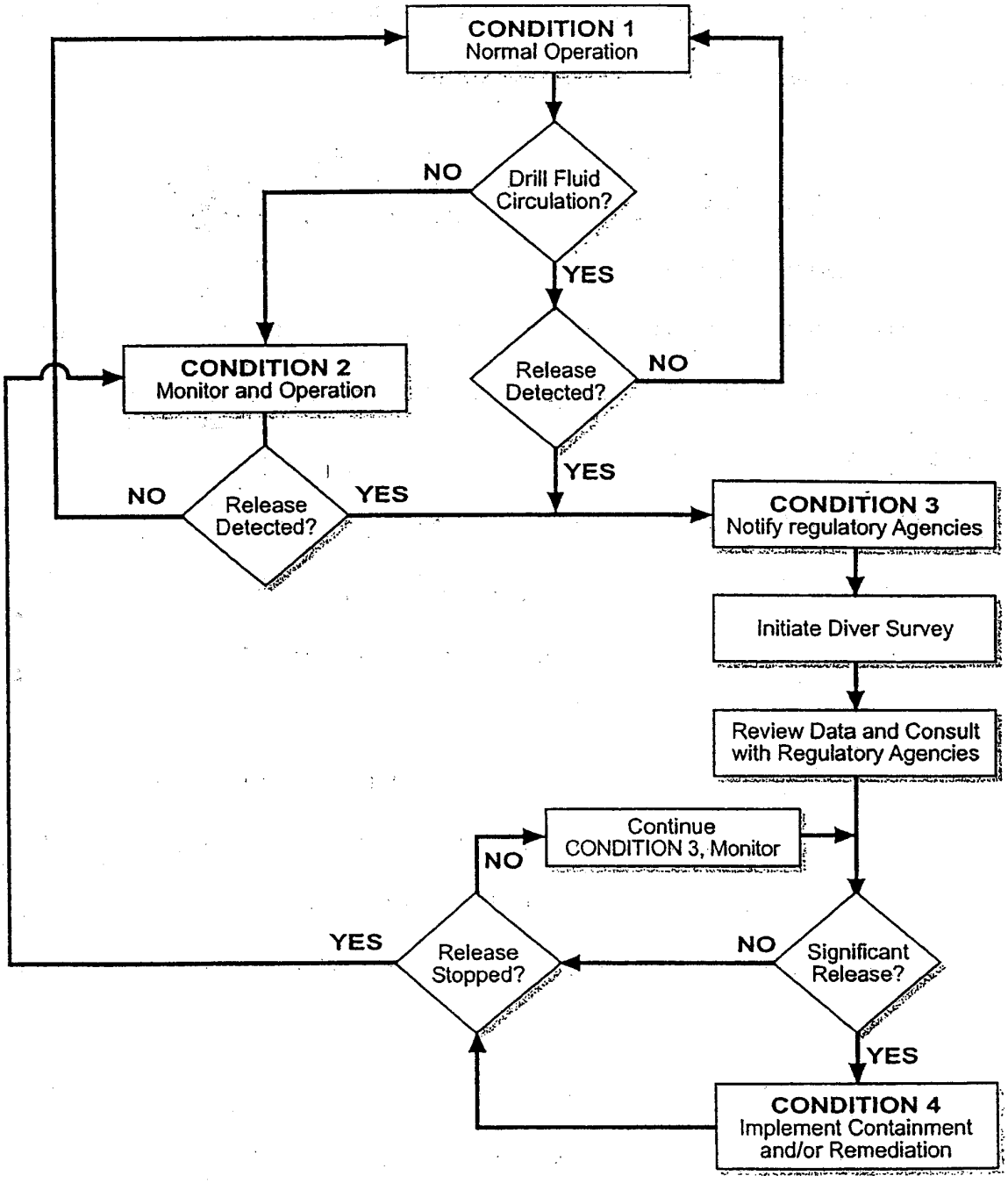
- Equipment breakdowns and repairs.
- Changes in drilling fluid pressure and the times of occurrence.
- Addition of drilling fluid to the system, including the time, volume and mixture proportions. The type and quantity of bentonite and dye shall also be recorded. The drillers will use Quick-Gel as the drilling fluid and Rhodamine WT dye or approved equivalents.

4.1.2 Monitoring Program

The on-site monitoring plan supervisor is responsible for coordinating the efforts of the monitoring team and interface with the driller, Islander East and CTDEP. Once weekly side scan sonar and fluorometric sampling will be conducted by the survey vessel. It is anticipated that several complete passes along the drill path will be made. The survey team will also routinely inspect any releases previously detected. The survey team will note any changes to the release: i.e., additional releases or change in depositional depth or size.

The side scan sonar will monitor the drill path from the centerline trackline with each pass made by the survey vessel. In addition, during routine monitoring, the side scan sonar will pass parallel to and approximately 50 feet away from the drill path to inspect with greater detail. If any unplanned releases are encountered, then underwater television will be used (visibility permitting) to inspect the area.

If an unplanned drilling fluid release is discovered by the survey vessel, and circulation is not lost, the monitoring team and drilling operations will be elevated to condition three immediately (refer to the flow chart in Figure 4-1). A dive team will be notified to report to the site to provide assistance with monitoring and assess the need for containment or possible cleanup operations. The remediation crew will be placed on alert and be made available within 24 hours, if necessary.



TRC
5 Waterside Crossing
Windsor, CT 06095
Customer-Focused Solutions (860) 298-9692

Islander East Pipeline Company

HORIZONTAL DIRECTIONAL DRILL MONITORING AND OPERATIONS PLAN OVERVIEW FLOWCHART

APPLICATION BY:
ISLANDER EAST PIPELINE CO., L.L.C.

Date: 12/01 | Figure 4-1

HAZ/31912/flochart.FH9

The monitoring plan supervisor will be responsible for maintaining records of the routine monitoring operations and the driller's operations as described in Section 4.1.1.

4.2 Condition Two: Loss of Circulation

4.2.1 Operation Program

Loss of circulation or drilling fluid returns is usually a result of blockage of the return path, release of drilling fluid into a void in the surrounding soil or rock stratum, or a breakout via a fissure from the drill hole to the surface.

The sequence of operations to be followed once circulation is lost shall be as follows (unless an alternative procedure mutually agreeable to the USACOE, CTDEP and Islander East is followed):

- The drilling supervisor will immediately notify the monitoring plan supervisor of the Condition Two status.
- The drill head may be retracted a short distance (20 feet) prior to any shutdown and the drill crew will investigate the cause of the circulation loss.
- If, circulation is regained, drilling activities will continue. The drilling operator will notify the monitoring plan supervisor.
- If, loss of circulation continues, drilling activities may continue while the Condition Two monitoring is being conducted. It is important to note that the loss of circulation should not be used as proof that a breakout has occurred or will occur.
- Drilling activities will continue following detection of an unplanned release by the monitoring team. Condition Three operations and monitoring will immediately take effect. The CTDEP, NMF and USACOE will all be notified within 24 hours of an unplanned release. A decision to continue drilling, monitoring protocol, containment and remediation will be subject to the review of the regulatory authorities. The drilling contractor will be permitted to periodically circulate drilling fluid and advance or retract the drill motor to prevent equipment loss or failure while the release is being evaluated by the regulatory authorities.

4.2.2 Monitoring Program

Upon notification of loss of circulation, the survey crew will elevate to Condition Two status and prepare for fluid release and containment monitoring. Focused monitoring using side scan sonar and fluorometry (during pilot hole) will continue as described in Section 4.1.2. The survey team will prepare the underwater television system for immediate use, if water visibility is more than 5 feet. Survey track lines will be conducted closer together and the location of the head of the drill marked by surface buoy. If circulation is reestablished, then Condition Two status will continue until a complete survey of the drill path is completed. If no releases are detected, the monitoring team will return to Condition One status.

If loss of circulation continues, the survey vessel will continue to monitor the drill path for two hours in an attempt to locate a breakout. The survey vessel will widen its search for a breakout to outside the immediate drill path area to include lateral depositional environments. Drilling activities may continue while the survey vessel widens the area of investigation to outside the immediate drill path area. If a breakout is not detected, drilling will continue and Condition Two monitoring will continue for one additional day and then return to Condition One. A log of all monitoring and drilling operations shall be kept by the monitoring plan supervisor and shall be available for inspection by CTDEP at all times. Quantities of drilling fluid used when loss of circulation occurs shall be recorded by the monitoring plan supervisor.

If a drilling fluid release is identified by the survey crew, then the status will be elevated to Condition Three. The dive team will be notified to report to the site to provide assistance with monitoring and cleanup operations if necessary. In the event of a detected drilling fluid release, the monitoring plan supervisor will immediately contact the:

a. CTDEP Oil and Chemical Spills Section of the Waste Management Bureau on their 24-hour hot line at (860) 566-3338.

b. CTDEP Office of Long Island Sound Programs at (860) 424-3034. The telephone notification will be followed by written notification to be sent by facsimile by the next business morning to the CTDEP Long Island Sound Programs at (860) 566-5488. The original written notice will be mailed to the CTDEP Office of Long Island Sound Programs at 79 Elm Street, Hartford, Connecticut, 06106-5127.

d. National Marine Fisheries (NMF) **Michael Ludwig**
NMFS – Habitat Conservation Division
212 Rogers Avenue
Milford, CT 06460
(203) 579-7004

e. U.S. Army Corps of Engineers (USACOE) **Diane Ray**
USACOE
696 Virginia Avenue
Concorde, MA 01742-2751
(978) 318-8335

4.3 Condition Three: Unplanned Drilling Fluid Release

4.3.1 Operation Program

Should the monitoring team detect an unplanned drilling fluid release when loss of circulation has occurred and cannot be re-established, the following steps apply:

- Continue drilling operations. The drilling fluid release remediation crew will be put on notice and shall be available within 24 hours.

- If circulation returns then drilling will continue as long as monitoring has determined that the release has slowed or has been determined by the CTDEP and USACOE that a significant impact will not result. The monitoring plan supervisor will consult daily with the CTDEP in order to maintain drilling operations. Discussion on what constitutes a significant impact is presented later in this section.

- During any drilling shutdown period, the driller will be permitted to circulate drilling fluid on a four hour cycle for a period of approximately 15 minutes. This is necessary to prevent complete blockage and loss of drilling equipment.

- If circulation does not return or significant release continues, then a determination shall be made by Islander East, the monitoring plan supervisor, the driller, USACOE and CTDEP as to whether to continue drilling. A decision to proceed will be based on the significance of impacts resulting from a continuing release and the ability to

contain and/or remediate the release. If the release does not pose a significant impact, as defined later in this section, then drilling may continue with the approval of the USACOE and CTDEP.

- The driller will be permitted to employ down hole techniques for sealing or controlling the rate of drilling fluid release subject to the approval of the CTDEP and USACOE. The driller may choose to add loss of circulation material to the drilling fluid and monitoring of the release point as defined in this section shall apply.

- If repeated attempts to seal the fissure by waiting or down hole techniques have failed to stop or reduce the release to acceptable levels, then the driller shall be permitted to grout the fissure with a cement-bentonite-water slurry or reroute the drill head. Sealing the fracture with grout will occur at the sea floor at the location of release, if practical. Grout will be injected into the fracture under pressure and be permitted to cure (harden). Divers will be used to guide the grout injection by positioning the injection pipe at the fissure. Grout will be fed from a boat above under pressure down the injection pipe and into the fissure.

- Following the grouting and curing period drilling will recommence and will continue if the release is stopped or reduced to a point where no significant impact will occur. The monitoring plan supervisor will consult with the USACOE and CTDEP prior to resuming drilling operations.

- If the decision is made to reroute the drill path because an acceptable solution cannot be achieved then the plans and procedures shall be discussed with the CTDEP, the USACOE, Islander East, the driller and the monitoring plan supervisor. Rerouting may involve both vertical and horizontal adjustments in the drill path. The abandoned borehole may be grouted to seal a potential fissure pathway for the rerouted borehole. Approvals for rerouting shall be obtained from both the CTDEP and USACOE.

- Grout to be used during the project will consist of a mixture of cement, bentonite and water. When the cement is fully hydrated, the grout will form a solid hardened mass. The same techniques are employed to abandon wells. The volume of grout required will depend on size of the fracture or upon the distance the drill head is withdrawn from the furthest point of advancement of the borehole. For example, if the drill head is retracted 100 feet, it will require approximately 2,000 gallons of grout. Fractures shall be monitored to ensure that grout pumping ceases if grout is observed at the surface. The grout will not be dyed and therefore will be distinguishable from the drilling fluid.

4.3.2 Monitoring Program

The survey vessel and divers will monitor the release area and continue to monitor the remaining drill path. The samples of the breakout material detected on the seafloor will be collected by the divers and/or survey vessel and the boundaries of the area impacted will be determined. The origin of the breakout will be located and surface buoyed. Television, side scan sonar, fluorometric and diving data will be collected to allow the environmental monitoring supervisor, drilling supervisor, USACOE and CTDEP to determine the significance of the release.

The diving team will be assigned to the release area to monitor the status of the release and collect samples. The diving team may assist with containment operations, if appropriate. The dive team and survey vessel will be in contact with the monitoring supervisor and drilling supervisor at all times via two-way radio. The dive team shall make measurements of the horizontal limits and depth of deposition of the drilling fluid. These measurements shall be made at slack tide during sealing and active drilling operations, while a release continues. The dive team will also make hourly visual observations of the release point to assess changes in flowrates and evaluate containment measures. The dive team shall be monitoring the release point when loss of circulation material is being fed to the borehole and during startup periods following shutdown of drilling operations.

In the event of a release, the dive team may be utilized to direct bentonite containment measures so as to minimize the area of impact, protect adjacent tidal wetlands, and facilitate removal of deposited material. This shall be performed within the first 24 hours of detection of a release. Additional divers will be available within 24 hours should they be required.

4.3.3 Remediation Crew Notification

Immediately following detection of a release, a remediation crew with a vacuum system shall be notified of a drilling fluid release condition and shall be able to mobilize and move to the site within 24 hours, if required by the USACOE or CTDEP, otherwise the USACOE or CTDEP can suspend drilling operations. The vacuum system shall be near the site and shall have all of the necessary staff, equipment, tools, supplies and fuel to be fully operational upon arrival. All documentation necessary for approval of the vacuum equipment and staff shall be submitted to the monitoring plan supervisor prior to commencement of drilling and they shall be permitted to inspect all equipment for approval prior to drilling.

4.3.4 Significant Impacts

The identification of the conditions which constitute a significant impact will be based on several factors as follows:

- The ability to contain the release within a 200 foot wide corridor centered on the HDD drill path.
- Drilling fluid deposits on the seafloor, which do not exceed 24 inches in depth.
- The presence and operation of the vacuum system equipment. Removal of drilling fluid deposits must exceed the rate of deposition from a continuing source.

In any event, the decision as to conditions which constitute a significant impact will be based on discussions between the USACOE, the CTDEP, Islander East, the monitoring supervisor and the driller. The USACOE and CTDEP shall make the final determination or ruling concerning impact decisions and further course of action.

4.4 Condition Four: Containment, Remediation and Monitoring

As described in previous sections, the identification of a release triggers additional containment, remediation and monitoring requirements:

- Bentonite containment measures may be required by the USACOE or CTDEP as a condition to continue drilling operation.
- The remediation crew shall be mobilized to the site within 24 hours of notice of this requirement from the regulatory authorities and shall be ready upon arrival.
- Intensive monitoring of the release area by the survey vessel and divers shall be implemented.

The following is a description of the work covered in this section and the materials and equipment to be utilized.

The contractor shall maintain on-site and have ready at all times at least 600 feet of bentonite containment fencing and 200 feet of floating silt curtain. This fence will be assembled and ready for immediate deployment by the diving team when a release, failure or breach is detected.

The contractor shall provide a remediation crew with a vacuum pump on-call in the New Haven area and be available on-site within 24 hours. The vacuum pump system will consist of a self contained unit with the capacity to store up to 110 barrels (approximately 4,600 gallons) of fluid. The diameter of the vacuum hose will be four inches minimum. The unit will be powered by a diesel engine driving a vacuum pump.

The divers will operate the suction end of the vacuum hose and control the removal of drilling fluid deposits. The divers shall also monitor the input of new drilling fluid into the release zone and notify the monitoring supervisor of conditions and progress hourly. Any changes which may result in significant impacts shall be reported immediately and a decision to halt drilling operations shall be reviewed with the USACOE and CTDEP.

In the event that the 4,600 gallon storage capacity of the vacuum pump system is not adequate to handle a release, then a barge or barges will be provided to store the released drilling mud and to supplement the vacuum system capacity. The need for barge capacity will be assessed immediately

following the containment system deployment and arrangements will be made to provide barge(s) as required. Disposal of the stored drilling mud will be the responsibility of Islander East's contractor to provide a cost effective and regulatory acceptable plan. The plan may include dewatering of the mud prior to disposal. The contractor will be responsible for obtaining all regulatory approvals required for treatment, transportation and disposal of the recovered drilling mud.

The need for other removal equipment is not anticipated at this time, but if the situation warrants additional equipment, then the details and methods for use of that equipment will be presented to the CTDEP for approval prior to its use.

In the event a bentonite release occurs outside the water, the release will be immediately contained with silt fencing or hay bales. The drilling fluid will be transferred manually or by pump into a storage tank and removed from the site. Condition Three operations will commence. The contractor shall store 100 feet of additional silt fencing or hay bales on site to contain a release on land.

The monitoring supervisor shall maintain records of the quantity of drilling fluid removed by vacuum equipment, transferal of the material to other containment and daily status of cleanup operations. The contractor shall be responsible for disposing of the vacuumed material and waste drilling fluids in an approved manner in accordance with all local, state and federal regulations. Records or manifests of the disposal shall be furnished to the CTDEP upon completion of the work.

4.5 Monitoring During Anticipated Releases of Drilling Fluid

Prior to commencement of drilling operations, an exit hole will be excavated at the offshore termination of the HDD. The size of the hole is currently under design. Divers will be deployed during the advancement of the pilot bore over the final 100 feet in order to monitor the progress,

location of drill motor, notify the drill operator of the drill motor breakthrough into the exit hole, and notify the drill operator of any observed releases of drilling fluid. Drilling fluid pumping will be stopped within a half hour of notification from the divers to the drill operator that the drill motor has penetrated the seafloor. The survey vessel will assist the divers in the monitoring during this phase. This method will minimize the anticipated release of drilling fluid as the drill motor exits upward through the excavated hole. Divers will assess the extent of the drilling mud release in and around the exit hole and report the information back to the drill rig operator and the monitoring team. The information will be furnished to the USACOE and CTDEP within 24 hours. After the drill motor is pushed through the seafloor and is laying on the bottom of the excavated hole, the drill motor and section of drill pipe attached to the motor will be removed. The exit hole area will then be prepared for the reaming operations as described in the HDD construction methodology. Various methods are under consideration for control of the drilling fluids during the reaming process. It is anticipated a substantial percentage of the drilling fluid used during the reaming process will be captured.

Divers will also be deployed at the exit hole during the pipeline pullback process, which is the final step in the completion of the horizontal directional drilling work. The excavated hole will provide containment for the drilling fluid to accumulate during the pipeline pullback. The divers will monitor the accumulation of the drilling fluid within the excavation and provide feedback to the contractor and monitoring team as to the thickness and extent of the drilling fluid accumulation. The survey vessel will assist the divers in the monitoring during this phase. Any migration or displacement of drilling fluid outside the exit hole excavation will be reported to the USACOE and CTDEP within 24 hours.

5.0 POST DRILLING MONITORING AND SAMPLING PLAN

In the event of a drilling fluid release, a site-specific post-remediation sampling protocol tailored to the actual impact area(s) will be submitted to the USACOE and CTDEP (in their respective jurisdictions) and implemented by Islander East. The protocol will be based upon the location, volume and spatial extent of release, with the goal of establishing whether adverse effects on benthic communities had occurred in the impact zone. Impacted habitat will be compared to unimpacted zones of the same habitat. Additionally, pre-drilling benthic data gathered in support of this permit application will be used for comparative purposes. Samples will be collected where possible, both to monitor depositional thickness and to evaluate benthic macroinvertebrate communities.

At a minimum, in the event of a drilling fluid release, an inspection of the entire drill path using remote sensing equipment with divers available to investigate any anomalies will be conducted approximately 48 hours and 10 days following the completion of all drilling activities if requested by the USACOE or CTDEP. A brief report summarizing the status of drilling fluid deposits shall be presented. The occurrence of fresh releases following the end of drilling shall also be recorded.

If benthic impact is detected, a follow-up study may be carried out by Islander East, if appropriate, the following summer to document the recolonization of benthic communities. The plan will be prepared and submitted to the USACOE and CTDEP for approval and will contain, at a minimum, three core samples per impacted habitat area and a minimum of five samples from within adjacent depositional area(s) and a comparable number of samples from reference sites.